REMARKS

Claims 1-38 are all the claims pending in the application. Claims 27-38 are newly added dependent claims.

I. Prior Art Rejections- 35 U.S.C. § 102

The Examiner rejected claims 1-3, 6, 11-17, 19, 20, and 22-24 under 35 U.S.C. 102(e) as allegedly being anticipated by Tanaka et al. U.S. Patent 6,123,341. Applicant traverses.

Claim 1

Claim 1 requires:

> ...recording an image on a recording material one line by one line, said line including one or more rows and said line being recorded by moving a recording head in a width direction of said recording material...detecting whether or not a print defect occurs on said recorded row; and performing correction recording relative to said row on which said print defect occurs.

Applicant submits that an image is recorded line by line, with a line including multiple rows. A row is recorded, and a determination of a defect is made on the recorded row and corrected as appropriate. To the extent that Tanaka determines a defect, it is not made in connection with recording of an image and any purported subsequent correction. Rather, the detection occurs at a predetermined testing time, which precedes image recording. (col. 2, line 64 to col. 3, line 5). Accordingly, there is a disconnect between the defect and correction such that Tanaka does not teach each feature of claim 1.

Applicant therefore respectfully requests the Examiner to withdraw this rejection to claim 1 and its dependent claims 2, 3, and 6.

Claim 11

Claim 11 requires:

> recording said rows with said recording head;
>
> detecting the broken recording element among said recording elements, said broken recording element being impossible to record due to its failure; and

recording said row to be recorded with said broken recording element, by moving said recording head again and by using another normal recording element among said recording elements.

The Examiner stated that "Tanaka et al. disclose... recording said rows with said recording head (Fig. 2, col. 8, lines 59-67); detecting the broken recording element among said recording elements, said broken recording element being impossible to record due to its failure (S7 of Fig. 10, col. 12, lines 26-32); and recording said row to be recorded with said broken recording element, by moving said recording head again and by using another normal recording element among said recording elements (Fig. 12, col. 13, lines 52-59)." (Office Action, pages 3-4).

However, Tanaka does not teach recording said row, then detecting a broken recording element, and then recording said row (again) with a normal recording element, where all operations take place in the same printing session. That is, Fig. 10 and col. 12 of Tanaka use a printed check pattern to determine if a dot-forming element is broken based on a missing row of dots or based on a stored print check pattern being non-coincident with the printed check pattern. (*See* col. 12, lines 6-34 and Figs. 3 and 10). Tanaka does not perform printing on said row of the printed check pattern with a normal recording element. Said row, of the printed check pattern, in Tanaka was used solely to determine the corresponding broken dot-forming element to be substituted for future printing; said row, of the printed check pattern, will not be printed on by the substituted recording element.

Applicant further submits that features of claim 11 are analogous to features of claim 1 with regard to error detection of a recorded row and correction on the basis of the recorded row. Therefore, the arguments set forth for claim 1 also apply for claim 11.

Since Tanaka does not anticipate claim 11, Applicant respectfully requests the Examiner to withdraw this rejection of independent claim 11 and its dependent claims 12-15.

Claim 14

Further regarding claim 14, the Examiner alleged that "Tanaka et al. disclose a serial printing method according to claim 13, wherein said test pattern is arranged at a lateral side of said row in said sub-scanning direction (Fig. 3, col. 9, lines 1-6)." (Office Action, page 4).

Fig 3 of Tanaka does not show that the check pattern is lateral to said row. The check pattern is multiple rows printed out corresponding to dot-forming elements to determine a defective dot-forming element. Col. 9, lines 1-6 of Tanaka explains that the capability check pattern may be printed (on a separate capability check sheet) out when an operator recognizes that print is abnormal but does not teach that the check pattern is printed out laterally to said row. (*See* Fig. 3 and col. 9, lines 1-6). Indeed, the Examiner has not identified said row and its lateral location relative to the check pattern in Tanaka.

If, *arguendo,* the Examiner assumed said row to be a row within the check pattern, then the check pattern could not be arranged to a lateral side of itself.

Applicant therefore respectfully requests that the Examiner withdraw this rejection to claim 14.

Claim 15

The Examiner mentioned that "Tanaka et al. disclose a serial printing method according to claim 13, wherein said test pattern is arranged at a downstream side of said row in said main-scanning direction (Fig. 3, col. 9, lines 1-6)." (Office Action, page 4).

Analogous to the remarks for claim 14, Tanaka does not teach that the check pattern in Fig. 3 is down stream from said row because the check pattern is on a separate sheet not having said row. Also, if the Examiner were to assume said row to be a row within the check pattern, the check pattern could not then be down stream from itself in the main-scanning direction.

Applicant therefore respectfully requests the Examiner to withdraw this rejection to claim 15.

Claim 16

Claim 16 requires, *inter alia:*

> when said failure detecting means detects said broken recording element, said control means controlling the record such that said recording material is moved by at least one row in said main-scanning direction to record with the normal recording element relative to said defective row, and successively the record being continued under a condition that said recording material is moved, in said main-scanning direction, in accordance with a number of the normal recording elements.

The Examiner cited col. 13 lines 52-59[1], which describes Fig. 12 as a flow chart for the substitution mode. Fig. 12, step S15 of the flow chart delineates "feed the paper a distance corresponding to the distance between #n and #p (Forward or Reverse direction)" (col. 14, lines 10-13). Tanaka does not teach when said failure detecting means detects said broken recording element, the record being continued successively under a condition that said recording material is moved, in said main-scanning direction, in accordance with a number of the normal recording elements. On the other hand, Tanaka moves the paper a distance between #n, the broken element, and #p, the substitute element. That is, Tanaka does not move the paper based on the number of normal recording elements.

Applicant respectfully requests the Examiner to withdraw this rejection to independent claim 16 and its dependent claim 17.

Claim 17

Further regarding claim 17, the Examiner noted that "Tanaka et al. disclose a serial printer according to claim 16, wherein when a number of the consecutive normal recording elements is N (N is an integer more than one and less than M), recording is performed with the consecutive normal recording elements, the number of which N, in a condition that said recording material is moved in said main-scanning direction every N rows (Fig. 12, col. 13, lines 52-59)." (Office Action, pages 5-6).

The Examiner has not identified in Tanaka where, if M is the total number of recording heads, then the recording material is moved in the main scanning direction every N rows, where N is the consecutive number of recording elements. The Examiner cited col. 13 lines 52-59, which describes Fig. 12 as a flow chart for the substitution mode. Fig. 12, step S15 of the flow chart delineates "feed the paper a distance corresponding to the distance between #n and #p (Forward or Reverse direction)" (col. 14, lines 10-13). Tanaka does not teach that the recording material is moved every N rows, where N is the number of consecutive normal recording elements. Rather, Tanaka moves the paper the distance between #n, the broken element, and #p, the substitute element.

[1] Office Action, pages 4-5.

Applicant therefore respectfully requests the Examiner to withdraw this rejection to claim 17.

Claim 19

Claim 19 includes, *inter alia:*

> when said failure detecting means detects said broken recording element, said control means controlling the record such that said recording material is moved by at least one row in said main-scanning direction to record with the normal recording element relative to said defective row, and successively the record being continued under a condition that said recording material is moved, in said main-scanning direction, in accordance with a number of the normal recording elements.

The remarks for patentability of claim 16, regarding successively moving the recording material, apply to claim 19 by analogy. Applicant respectfully requests the Examiner to withdraw this rejection of independent claim 19 and its dependent claim 20.

Claim 20

Further regarding claim 20, the Examiner indicated that "Tanaka et al. disclose a serial printer method according to claim 19, wherein when a number of the consecutive normal recording elements is N (N is an integer more than one and less than M), recording is performed with the consecutive normal recording elements, the number of which is N, in a condition that said recording material is moved in said main-scanning direction every (N-K) rows (K is an integer less than N) to overlap the K rows (Fig. 14, col. 16, lines 28-36)." (Office Action, page 7).

However, "Fig. 14 [of Tanaka] is a flow chart showing the printing operation of the serial recording apparatus when the apparatus is in a substitution mode. In the description of the printing operation, it is assumed that a plural number of the pi-th (i=positive integer) dot-forming elements is selected as the substitution dot-forming elements for a plural number of ni-th (i=positive integer) dot-forming elements which are defective." (col. 16, lines 28-36). Fig. 14, step S36 of the flow chart requires "feed[ing] the paper by the distance between #nj (defective) and #pj (substitution)." (Fig. 14, step S36).

Neither Fig. 14 nor col. 16, lines 28-36 describes wherein when a number of the consecutive normal recording elements is N, recording is performed with the consecutive normal

recording elements, the number of which is N, in a condition that said recording material is moved in said main-scanning direction every (N-K) rows to overlap the K rows. Unlike claim 20, Tanaka teaches that the paper is fed the distance between the defective and substitute element and that a plural number of substitute elements are to replace a plural number of defective elements. However, Tanaka fails to teach the features of claim 20 described above, and therefore Applicant respectfully requests the Examiner to withdraw this rejection of claim 20 and dependent claim 23.

Claim 22

Claim 22 includes:

> discharging said recording material on which said image has been recorded, from said printer;
>
> setting said discharged recording material to said printer again;
>
> detecting whether or not a print defect occurs on said recorded row; and performing correction recording relative to said row on which said print defect occurs.

The Examiner indicated that "Tanaka et al. disclose a serial printing method for recording an image on a recording material one line by one line, said line including one or more rows and said line being recorded by moving a recording head of a printer in a width direction of said recording material, said serial printing method comprising the steps of: discharging said recording material on which said image has been recorded, from said printer (S2 of Fig. 10, col. 12, lines 13-16); setting said discharged recording material to said printer again (S3 of Fig. 10, col. 12, lines 16-19; detecting whether or not a print defect occurs on said recorded row (S4 of Fig. 10, col. 12, lines 20-22) and performing correction recording relative to said row on which said print defect occurs (Fig. 12, col. 13, lines 52-59)." (Office Action, page 7).

Steps S2-S4 of Fig. 10 respectively state "drive the recording head by the image data to execute the printing"; "scan the print result by the image sensor to gather the data"; and "compare the data gathered by the scan with the image data of the image buffer".

Col. 12, lines 13-22 of Tanaka reads "[t]hen, the print control device reads out the image data from the image buffer, and drives all the dot-forming elements of the recording head 1 by the image data, to thereby print the check pattern on the recording sheet (step S2). The print

control device moves the carriage 4 to scan the printed check pattern with the line image sensor 37 and to read out the check pattern (step S3). The print control device compares the readout check pattern data with the check pattern data of the image data used for the printing (step S4)." (col. 12, lines 13-22). Fig. 12 and col. 13, lines 52-59 describe using a substitute dot-forming element in place of the defective dot-forming element.

Printing out a check pattern, scanning it with the line sensor, determining the defective dot-forming element, and then sending print data to a substitute dot-forming element for printing on a different sheet in Tanaka is unlike and distinct from "discharging said recording material on which said image has been recorded, from said printer; setting said discharged recording material to said printer again; detecting whether or not a print defect occurs on said recorded row; and performing correction recording relative to said row on which said print defect occurs" in claim 22. The printed check pattern in Tanaka is not used to determine a print defect on said printed check pattern on said row and then perform correction recording relative to said row of said check pattern where the defect occurs. In short, the printed check pattern of Fig. 3 in Tanaka is discarded after determining whether a row is defective. Correction recording is not performed on the same printed check pattern relative to a defect found on a row of said printed check pattern, i.e., the dots in Fig. 3 of Tanaka are not corrected on the printed check pattern by the substitute dot-forming element.

Also, the Examiner has not addressed, in Tanaka, the requirement of "setting said discharged recording material to said printer again" in claim 22.

Claim 22 is therefore not anticipated by Tanaka and Applicant respectfully requests the Examiner to withdraw this rejection of independent claim 22 and its dependent claim 23.

Claim 24

Claim 24 requires, *inter alia:*

> image-area detecting means for obtaining positional information of an image area of said recording material already recorded;
>
> data making means for making correction image data by calculating positional difference and inclination between said positional information of said image area and positional information of said image data, said data making means inclining

> and moving said image data in accordance with said positional difference and said inclination;
>
> ...operation means for comparing said measured density with said predicted density every portion, said operation means obtaining density difference of the defective portion having said measured density which is less than said predicted density; and
>
> record correcting means for performing correction recording relative to said defective portion, said record correcting means moving said carriage again for the defective portion and driving said recording head in accordance with said density difference during the movement of said carriage.

The Examiner indicated that Tanaka teaches an "**[First]** an image-area detecting means for obtaining positional information of an image area of said recording material already recorded (line image sensor 37 of Fig. 9, col. 11, lines 56-57); **[Second]** data making means for making correction image data by calculating positional difference and inclination between said positional information of said image area and positional information of said image data, said data making means inclining and moving said image data in accordance with said positional difference and said inclination (S13 of Fig. 12, col. 13-14, lines 67, 1-6); **[Third]** operation means for comparing said measured density with said predicted density every portion, said operation means obtaining density which is less than said predicted density (Fig. 8, col. 11, lines 39-49); and **[Fourth]** record correcting means for performing correction recording relative to said defective portion, said record correcting means moving said carriage again for the defective portion and driving said recording head in accordance with said density difference during the movement of said carriage (S17 of Fig. 12, col. 14, lines 20-25)." (Office Action, page 8-9).

First, the line image sensor 37 of Fig. 9 and col. 11, lines 56-57 do not describe an image-area detecting means for obtaining positional information of an image area of said recording material already recorded. Instead, col. 11, lines 56-57 states "the structure includes a line image sensor 37 optically reading dots printed on a recording sheet." Further, col. 12, lines 6-34 of Tanaka explains how the print control device compares printed check patterns read by the lime image sensor 37 with stored check patterns in the memory, and when the dots of the check pattern do not overlap, the print control device judges that a dot-forming element is defective.

Nevertheless, the line image sensor 37 of Tanaka does not obtain positional information of a previously recorded image area.

Second, col. 13, line 67 and col. 14, lines 1-6 of Tanaka do not discuss a data making means for making correction image data by calculating positional difference and inclination between said positional information of said image area and positional information of said image data, having said data making means inclining and moving said image data in accordance with said positional difference and said inclination. Rather, Tanaka teaches that the print data of the defective dot-forming element is sent to and eventually printed by the normal dot-forming element[2]. Already established is that Tanaka does not obtain positional information of an image area. Tanaka also would not [and has no need to] calculate the positional difference between an image area and image data to obtain correction image data. Consequently, Tanaka does not and would not incline and move image data in accordance with the positional difference of the image area and image data. Moreover, the Examiner has not identified in Tanaka the elements of claim 24 regarding the data making means.

Even if the Examiner were, *arguendo*, to identify the print data transferred from the defective dot-forming element to the normal dot-forming element in Tanaka as correction image data, Tanaka's correction image data would not be based on the difference in positional information between an image area and image data to move and incline correction data.

Third, Fig. 8 and col. 11, lines 39-49 of Tanaka was applied by the Examiner for describing an operation means for comparing said measured density with said predicted density every portion, said operation means obtaining density which is less than said predicted density. However, Fig. 8 and col. 11, lines 39-49 of Tanaka determine if an impact wire of a recording head 1 is defective based on its voltage being below a threshold value after impacting a piezoelectric element[3]. It is unclear how the operation means is met by the applied passage.

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[2] *See* Tanaka col. 13, line 67 and col. 14, lines 1-6.

[3] *See* Fig. 8 and col. 11, lines 39-49. Fig. 8 depicts a bar graph having detector voltages with a demarcated threshold and test voltages of various wires.

Fourth, S17 of Fig. 12 and col. 14, lines 20-25 fail to teach a record correcting means for performing correction recording relative to said defective portion, said record correcting means moving said carriage again for the defective portion and driving said recording head in accordance with said density difference during the movement of said carriage. S17 of Fig. 12, and col. 14, lines 20-25 of Tanaka both explain that data is sent from a buffer to the head drive device. However, no account is given in S17 of Fig. 12 and col. 14, lines 20-25 cited by the Examiner for performing correction recording on said defective portion, and driving the recording head based on the density difference.

Because Tanaka fails to teach the features pointed out above, Applicant respectfully requests the Examiner to withdraw this rejection of claim 24.

II. Claim Rejections - 35 USC § 103

Claim 4

The Examiner rejected claim 4 under 35 U.S.C. 103(a) as allegedly being unpatentable over Tanaka et al. U.S. Patent 6,123,341 as applied to claim 1 above, and further in view of Aosaki et al. U.S. Patent 5,467,198.

Tanaka is deficient vis-à-vis independent claim 1. Aosaki is applied for its teaching regarding thermosensitive recording paper, but Aosaki does not make up for the deficiencies of Tanaka.

Applicant therefore respectfully requests the Examiner to withdraw this rejection of dependent claim 4.

Claim 5

The Examiner rejected claim 5 under 35 U.S.C. 103(a) as allegedly being unpatentable over Tanaka et al. U.S. Patent 6,123,341 as applied to claim 1 above, and further in view of Saito U.S. Patent 4,561,789.

Tanaka is deficient vis-à-vis independent claim 1. Saito is applied for its teaching regarding utilizing thermally melted ink, but Saito does not make up for the deficiencies of Tanaka.

Applicant therefore respectfully requests the Examiner to withdraw this rejection of dependent claim 5.

Claims 7 and 10/7

The Examiner rejected claims 7, 8, and 10 under 35 U.S.C. 103(a) as allegedly being unpatentable over Tanaka et al. U.S. Patent 6,123,341 and Noyes et al U.S. Patent 6,775,022.

Claim 7 includes, *inter alia*:

> density measuring means attached to said carriage and for obtaining a measured density of a recorded portion when said carriage is moved backward;
>
> ...record correcting means for performing correction recording relative to the defective portion having said density difference, said record correcting means reciprocating said carriage again for the defective portion and driving said recording head in accordance with said density difference during the forward movement of said carriage...

The Examiner noted that Tanaka does not have measure density when moving backwards but Noyes measures density while moving backwards in col. 86, lines 30-34. (*See* Office Action, pages 10-11).

Even though Noyes teaches scanning for dot density, Noyes does not compensate for the deficiencies of Tanaka discussed by Applicant throughout this response. Particularly, Tanaka does not teach an "record correcting means for performing correction recording relative to the defective portion having said density difference, said record correcting means reciprocating said carriage again for the defective portion and driving said recording head in accordance with said density difference during the forward movement of said carriage" and Noyes does not make up for this deficiency.

As discussed earlier in this response, Tanaka does not correct the defective portion on the printed check pattern (which is printed and scanned to determine a missing row of dots corresponding to a defective dot-forming element). Instead, Tanaka recognizes that a dot-forming element is broken based on the printed check pattern and sends print data destined for the broken dot-forming element to a substitute dot-forming element to be printed on a separate and distinct sheet from the printed check pattern. That is, detection and correction in Tanaka are not performed on the same sheet during the same printing session.

Further, regarding the text applied by the Examiner for Noyes, Noyes discusses how to prevent "smear" when printing. "Step S7304 represents normal printout by the printer, during each scan of which the print controller 110 determines whether dot density for any one scan exceeds a driver-settable threshold for dot density (step S7305). Unless dot density for any one scan exceeds the threshold, no special processing is needed..."(col. 86, lines 30-35). From the text of Noyes applied by the Examiner, it is unclear how Noyes teaches "density measuring means attached to said carriage and for obtaining a measured density of a recorded portion when said carriage is moved backward" of claim 7.

Applicant thus respectfully requests the Examiner to withdraw this rejection to claim 7 and its dependent claim 10/7.

Claims 8 and 10/8.

Claim 8 requires, *inter alia*:

> second density measuring means disposed on the other side of said recording head in said sub-scanning direction, said second density measuring means obtaining a measured density of a recorded portion just after recording when said carriage is moved backward;
>
> record correcting means for performing correction recording relative to said defective portion, said record correcting means reciprocating said carriage again for the defective portion and driving said recording head in accordance with said density difference during the movement of said carriage...

The discussion for claim 8 is analogous to claim 7 in that Tanaka does not correct the defective portion on the printed check pattern (which is printed and scanned to determine a missing row of dots corresponding to a defective dot-forming element), instead Tanaka recognizes that a dot-forming element is broken and sends print data destined for the broken dot-forming element to a substitute dot-forming element to be printed on a separate and distinct sheet from the printed check pattern. Therefore, Tanaka does not teach a "record correcting means for performing correction recording relative to the defective portion having said density difference, said record correcting means reciprocating said carriage again for the defective portion and driving said recording head in accordance with said density difference during the forward movement of said carriage" of claim 8 and Noyes does not make up for this deficiency.

The Examiner indicated that "obtaining a measured density of a recorded portion just after recording when said carriage is moved backward (col. 86, lines 30-34)[4]", but it is unclear how this requirement is met in Noyes. Nevertheless, Noyes still does not compensate for the deficiencies of Tanaka and therefore Applicant respectfully requests the Examiner to withdraw this rejection of claim 8 and its dependent claim 10/8.

Claim 9

The Examiner rejected claim 9 under 35 U.S.C. § 103 as allegedly being unpatentable over Tanaka et al. U.S. Patent 6,123,341 and Noyes et al U.S. Patent 6,775,022 as applied to claims 7 and 8 above, and further in view of Terajima et al U.S. Patent 6,785,026.

The Examiner applied Terajima for having a light emitting element. (Office Action, pages 14-15). However, Terajima and Noyes do not compensate for the deficiencies of Tanaka vis-à-vis independent claims 7 and 8.

Applicant therefore respectfully requests the Examiner to withdraw this rejection of dependent claim 9.

Claims 18 and 21.

Claims 18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. U.S. Patent 6,123,341 as applied to claims 17 and 20 above, and further in view of Terajima et al U.S. Patent 6,785,026.

The Examiner applied Terajima because "Tanaka et al. disclose density measuring means but do not disclose expressly using a light emitting element for the density measuring means." (Office Action, pages 14-15). However, Terajima does not compensate for the deficiencies of Tanaka vis-à-vis independent claims 16 and 19.

Applicant therefore respectfully requests the Examiner to withdraw this rejection of dependent claims 18 and 21.

[4] Office Action, page 13.

Claim 25

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. U.S. Patent 6,123,341 as applied to claim 24 above, and further in view of Noyes et al. U.S. Patent 6,297,888.

Tanaka fails to teach the features of independent claim 24. Noyes, applied by the Examiner for measuring a border, does not compensate for the deficiencies of Tanaka.

Therefore Applicant respectfully requests the Examiner to withdraw this rejection of dependent claim 25.

Claim 26.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. U.S. Patent 6,123,341 and Noyes et al. U.S. Patent 6,297,888 as applied to claim 24, above, and further in view of Terajima et al. U.S. Patent 6,785,026.

Tanaka is deficient vis-à-vis independent claim 24. Terajima is applied for its teaching regarding a light emitting element and Noyes is applied for its teaching regarding borders. However, neither Terajima nor Noyes makes up for the deficiencies of Tanaka.

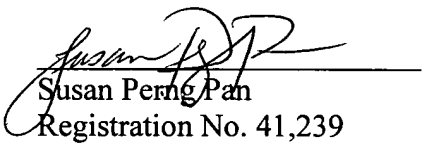
Therefore Applicant respectfully requests the Examiner to withdraw this rejection of dependent claim 26.

III. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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